

# Exp 5-Best First Search

NAME- SANKALP JAIN

REG NO - RA1911026010119

AIM- To find the shortest path using BEST first search

ALGORITHM-

RA 191102 60 10119

Sankalp Jain

Best First Search

Algorithm:-

- (1) Create 2 empty lists : OPEN and Closed
- (2) Start from initial Node (say N) & Put in 'ordered' open list.
- (3) Repeat steps until GOAL Node is Reached
  - (i) If open list is empty, then exit loop.
  - (ii) Select first / Top Node (say N) in open list & Move it to closed list. Also capture info of Parent Node
  - (iii) If N is goal node, then Move Node To Closed list & exit loop.
  - (iv) If N is not goal node, expand Node N to generate immediate Next Nodes linked to Node N & Add all to open list
  - (v) Reorder Nodes in open list in ascending order according to an evaluation function  $f(n)$

CODE-

```
from queue import PriorityQueue
import matplotlib.pyplot as plt
import networkx as nx

# for implementing BFS | returns path having lowest cost
def best_first_search(source, target, n):
    visited = [0] * n
    visited[source] = True
    pq = PriorityQueue()
    pq.put((0, source))
    while pq.empty() == False:
        u = pq.get()[1]
        print(u, end=" ") # the path having lowest cost
        if u == target:
            break

        for v, c in graph[u]:
            if visited[v] == False:
                visited[v] = True
                pq.put((c, v))
    print()

# for adding edges to graph
def addedge(x, y, cost):
    graph[x].append((y, cost))
    graph[y].append((x, cost))

G = nx.Graph()
v = int(input("Enter the number of nodes: "))
graph = [[] for i in range(v)] # undirected Graph
e = int(input("Enter the number of edges: "))
print("Enter the edges along with their weights:")
for i in range(e):
    x, y, z = list(map(int, input().split()))
    addedge(x, y, z)
    G.add_edge(x, y, weight = z)

source = int(input("Enter the Source Node: "))
target = int(input("Enter the Target/Destination Node: "))
print("\nPath: ", end = "")
best_first_search(source, target, v)
```

OUTPUT-

The screenshot shows a code editor with a file explorer on the left and a terminal at the bottom. The file explorer shows a directory structure under 'Dr.T.R.Saravanan' with subdirectories 111 through 119, and a file 'bestfirstsearch.py' in the 'epx5 - 119' directory. The code editor displays the following Python code:

```
27 v = int(input("Enter the number of nodes: "))
30 graph = [[] for i in range(v)] # undirected Graph
31 e = int(input("Enter the number of edges: "))
32 print("Enter the edges along with their weights:")
33 for i in range(e):
34     x, y, z = list(map(int, input().split()))
35     addedge(x, y, z)
36     G.add_edge(x, y, weight = z)
37
38 source = int(input("Enter the Source Node: "))
39 target = int(input("Enter the Target/Destination Node: "))
40 print("\nPath: ", end = "")
41 best_first_search(source, target, v)
```

The terminal at the bottom shows the command '119/epx5\ -\ 119/bestfirstsearch.py' being executed. The output is as follows:

```
bash - "lp-172-31-1-82" x 119/epx5\ -\ 119/bestfirsts x
Run Command: 119/epx5\ -\ 119/bestfirstsearch.py
Enter the number of nodes: 8
Enter the number of edges: 7
Enter the edges along with their weights:
0 1 3
0 2 4
1 3 5
1 4 4
2 5 7
3 6 9
3 7 11
Enter the Source Node: 0
Enter the Target/Destination Node: 6
Path: 0 1 2 4 3 5 6
```

RESULT-Hence we successfully found the shortest path using BEST first search